The Cost-Effectiveness of Alternative Methods of Delivering Housing Subsidies

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"Those who do not remember the past are condemned to repeat it" George Santayana

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Abstract

The empirical literature is unanimous in finding that tenant-based housing certificates and vouchers provide housing of any quality at a much lower total cost (that is, cost to all levels of government and tenants) than the types of project-based assistance studied, namely Public Housing, Section 236, and Section 8 New Construction and Substantial Rehab. However, these studies are so old and inaccessible that they are unknown to most people involved in current discussions of housing policy. This paper discusses the theoretical reasons to expect that these types of project-based housing programs will have excessive costs, presents a conceptually correct methodology for the cost-effectiveness analysis of housing programs, and provides a description and critical appraisal of the data and methods used in these earlier studies as well as a summary of their results. It concludes that cost-effectiveness analyses of current forms of project-based housing assistance should be the highest priority for research on housing policy.

I.		Introduction

Between 1937 and 1974, the U.S. government delivered rental housing subsidies to low-income households almost exclusively via the construction and operation of housing projects for these households. Local public housing authorities operated all of the projects built during the first seventeen years.[1]

In 1954, the federal government began to contract with private parties to build and operate projects for low-income households, while still continuing to build public housing projects. These parties agreed to provide housing meeting certain standards to households with particular characteristics for a specified number of years. The overwhelming majority of the projects were newly built. Almost all of the rest were substantially rehabilitated as a condition for participation in the program.

The earlier programs such as HUD's Section 221(d)(3) Market Interest Rate (MIR) Program and Section 202 Program limited the private parties who operate the projects to nonprofits and cooperatives.[2] These programs were succeeded by programs such as Section 236 that allowed the participation of for-profit firms, while attempting to limit their profits by restricting their net revenues during the period of the use agreement. For-profit firms have accounted for the majority of the units in the most recent programs such as Section 8 New Construction/Substantial Rehabilitation and the Low Income Housing Tax Credit.

Until 1965, all housing assistance to the poor was project-based and the overwhelming majority of units were newly constructed under a government program. In 1965 Congress created Section 23, a program under which public housing authorities could lease apartments in existing private unsubsidized housing for the use of households eligible for public housing. One variant of this program allowed tenants to locate their own apartments meeting the program's minimum standards. This was the first program of tenant-based assistance in the United States.

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[1] The dates mentioned in this section are the dates of the legislation that led to programs. Programs do not become operational until regulations are written.
[2] Although the original Section 221(d)(3) Program is called the Market Interest Rate Program, both programs provide financing at below-market interest rates. The later Section 221(d)(3) Below-Market Interest Rate (BMIR) Program provided a more substantial interest subsidy than the Section 221(d)(3) MIR Program.

In 1974, the Section 8 Existing Housing Program replaced Section 23. Since then, tenant-based Section 8 has become the country's largest program of housing assistance. The original program was called the Certificate Program. Another program of tenant-based housing assistance, called the Section 8 Voucher Program, that had somewhat different constraints than the Certificate Program was introduced as a demonstration program in 1983 and made permanent in 1989. This program operated simultaneously with the Certificate Program until 1998 when the two programs were consolidated into another tenant-based program, called the Housing Choice Voucher Program, which combined features of the two earlier programs.

Research on the cost-effectiveness of various types of project-based assistance was influential in the enactment of the Section 8 Existing Housing Program and its rapid growth. This research indicated that the development and operating cost of units built under the construction programs studied greatly exceeded the market rents of these units. This research was also influential in bringing about the termination of the Section 8 New Construction / Substantial Rehabilitation Program in 1983. Since then, few new units have been authorized under HUD's construction programs.[3]

Despite the rapid growth of the tenant-based Section 8 Certificate and Voucher Programs, the majority of additional recipients of rental housing assistance since 1983 have received project-based assistance. In part this is due to the completion of Section 8 New Construction/Substantial Rehabilitation projects that were in the pipeline at the time that the program was terminated. More important has been the rapid growth of the IRS's Low Income Housing Tax Credit (LIHTC) that was enacted hastily as a part of the Tax Reform Act of 1986. More than a million units have been authorized, and about 700,000 units have been built, under this program. It will soon become the second largest housing program for low-income households. Furthermore, with substantial money from HUD, local housing authorities are demolishing their worst projects *and* building additional projects, albeit at lower densities. HUD also provides substantial block grants to state and local housing agencies under the HOME Investment Partnerships Program enacted in 1990. These funds are used primarily for project-based assistance. Finally, HUD devotes

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[3] Many additional units were built after 1983 due to the long lags between the time that money is appropriated under these programs and the time that projects are completed.

a substantial fraction of its budget to operating and modernization subsidies for public housing and privately owned projects, beyond the subsidies promised at the time that these projects were built. In short, there has been a tremendous resurgence in project-based assistance via the tax system, federal block grants to state and local governments, and the substantial additional subsidies to public housing and privately owned projects.

Since these new and revised programs have the features that were believed to be the source of the substantial cost-ineffectiveness of the programs studied, it seems reasonable to conclude that recent housing policies have been designed by policymakers who are unaware of the previous research. The reasons for this ignorance are not hard to imagine. First, the LIHTC was designed rapidly with little input from housing policy specialists who would have been aware of the aforementioned studies. Second, the existing studies are old. The most recent study was completed in 1982. Third, they are either highly technical or poorly documented. Three of the five are lengthy technical reports on research done under HUD contracts. It is safe to say that few people have waded through these studies, and many who did read them have not been involved in discussions of housing policy in recent times. The methods used in the oldest of the studies were not published.[4]

Based on the most reliable existing estimates of cost-effectiveness, we could serve all current recipients of housing subsidies as well as they are currently served (that is, equally good housing with the same tenant rental payment) and serve several million additional households below the poverty line by devoting all of the money currently devoted to discretionary project-based assistance to tenant-based assistance. Since the current programs of project-based assistance are not identical to the programs that have been studied, it would obviously be desirable to launch cost-effectiveness studies of all of the major discretionary expenditures on project-based assistance such as incremental commitments under the LIHTC and HOPE VI and public housing operating and modernization subsidies. However, since these would be multi-year projects involving substantial original data collection and are more likely to be launched by policymakers who are aware of the findings of the earlier studies, an important first step is to provide a

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[4] I have complete documentation of the data and methods used to estimate the cost-effectiveness of public housing in *Housing in the Seventies*.

clear description and critical appraisal of the data and methods used in these earlier studies as well as a summary of the results. These are the purposes of this paper.

Section 2 discusses the reasons to expect that project-based housing assistance will be cost-ineffective compared with tenant-based vouchers. Section 3 describes the steps in an ideal cost-effectiveness analysis. Section 4 compares the methodology used in previous studies with the ideal and discusses the strengths and weaknesses of the data and methods used to estimate the inputs required to calculate the cost-effectiveness of the program under consideration. Section 5 summarizes the results.

II.   Theoretical Expectations about Cost-Effectiveness

All cost-effectiveness analyses of housing programs involve a comparison of the total cost of providing the housing with its market rent. For tenant-based vouchers and certificates, the approach is straightforward because all of the costs associated with providing the housing during a period occur in that period and they are all in the records of the administering agency. Dealing with project-based assistance is more difficult because the time path of costs bears no particular relationship to the time path of the market rents of the units and all project-based assistance involves indirect costs that are not in the records of the administering agency. The most widely accepted measure of cost-effectiveness for project-based housing assistance is the ratio of (1) the present value of the rents paid by tenants and all direct and indirect costs incurred by federal, state, and local governments to (2) the present value of the market rents of the units over the period that the units are used to house subsidized families. If a government owns the project at the time that it stops being used to house subsidized families, the present value of the project's market value at that time should be subtracted from the present value of the costs.

This measure of cost-effectiveness does not capture all of the potential benefits or costs of a housing program. For example, it is possible that some housing projects make the neighborhoods in which they are located more attractive places to live. Other projects may have the opposite effect. The standard measure of cost-effectiveness captures neither positive nor negative effects of this sort.

5

Broadly speaking, there are three potential sources of cost-ineffectiveness of housing programs – distortions in input choices for producing housing services, insufficient incentives for efficiency on the part of civil servants, and excessive profits to developers of private projects. This section discusses each source.

Almost all of the subsidies for housing projects are subsidies for the initial development of the project or subsidies that are independent of input usage. For example, some programs provide direct loans for development at below-market interest rates, others pay a fixed proportion of the mortgage payment on private loans, still others provide tax credits that are proportional to development cost, and some pay directly the entire development cost. Among subsidies that do not depend on input usage are rental assistance payments under the Section 8 NC/SR Program and Public Housing operating subsidies since 1975. (Although they are called operating subsidies, the latter do not depend on the housing authority's actions.)

This has led some to conclude that housing services in these projects will be produced with too much initial capital and too little of other inputs from the viewpoint of efficient production. However, since all of these programs contain limits on development costs, the net effect on input usage is ambiguous on theoretical grounds. Nevertheless, the combination of capital subsidies and development cost limits surely results in productive inefficiency to some extent.

The preceding argument applies most directly to for-profit firms who own and operate housing for low-income households. However, to the extent that the decision makers in local housing authorities and nonprofit organizations are interested in the well being of the occupants of their projects rather than taxpayers elsewhere, they apply with some force to these other providers.

Another incentive for inefficient production of housing services in privately-owned projects is that the supplier's revenue is independent of the condition of the apartment, provided that it meets the program's minimum occupancy standards. Given the below-market rents that subsidized households are charged, there is a tremendous excess demand for these units for many years after they are built. Therefore, owners will have no trouble renting these units even if they are allowed to deteriorate substantially.

Just as in the case of simple rent control, this should lead to too little maintenance from the viewpoint of efficient production of housing services.

An additional source of inefficiency is involved in the case of public housing. Under the public housing program, government employees make all of the decisions that are made by managers of profit maximizing firms in the private market. These include the exact specifications of the project to be built and exactly what maintenance and renovations to undertake. These decisionmakers also must monitor the performance of the employees of the housing authorities. The government managers involved do not have the same financial incentives to operate efficiently as owners of private rental housing. If they make good decisions, they are not rewarded. If they make bad decisions, they suffer no consequences over a wide range of bad decisions. Indeed, they cannot easily learn whether they have made good or bad decisions. Due to the subsidy, they will not lose their tenants even if they make bad decisions.

The other construction and rehabilitation programs such as Section 8 NC/SR and the Low Income Housing Tax Credit provide subsidies to selected private suppliers, albeit with restrictions concerning who may live in the units, how much rent may be charged, etc. The subsidies and restrictions are designed (or redesigned based on initial experience) to insure that the money budgeted is spent. In all cases, the result has been that many more suppliers want to participate than can be accommodated with available funds. For example, developers have requested three times as much money as state housing agencies have to allocate under the LIHTC. The reason that there is an excess demand for program funds by suppliers of housing is that those who are allowed to participate make excessive profits, provided that they do not have to pay anything for the privilege. Why else would these developers be willing to pay so much money to influential people for help in getting their projects approved?

III.   An Ideal Cost-Effectiveness Analysis

In calculating the cost-effectiveness of a housing program involving new construction or substantial rehabilitation, it is essential to take a life cycle approach. Consider, for example, two construction programs that produce identical housing in the

same locations. Assume that the units are equally well maintained over time. So the units under these programs are identical at every point in time and hence the programs are equally effective. Assume that the initial development cost and later operating cost under the two programs are the same, but that the initial development cost is financed by a capital grant under one program and by annual contributions to pay principal and interest on a market-rate loan under the other program. These programs are equally cost-effective. However, if we base our estimates of cost-effectiveness on the market rents of the units and the costs paid in any year after the payment of the capital grant and before the repayment of the loan, we will incorrectly conclude that the program that received the capital grant is much more cost-effective. Although taking a life cycle perspective to the cost-effectiveness of housing programs is more difficult, it is both feasible and essential for making meaningful comparisons of different types of housing programs.

The conceptually correct method for conducting a cost-effectiveness analysis of a housing program is straightforward. In each year of its existence, a certain total cost C(t) is incurred and the units occupied under the program had a certain total market rent R(t). If none of the units built or rehabilitated under a program are used any longer to house low-income households under that program and if the government did not own the projects under the program, then the cost-effectiveness of the program is simply the ratio of the present value of the costs C(t) to the present value of the market rents R(t) at some appropriate interest rate. (The appropriate interest rate is an important conceptual issue that will be discussed later so as not to detract from the flow of the analysis.) The present value of the cost is simply

$$\sum_{t=0}^{T} \frac{C(t)}{(1+r)^{t}}$$

and the present value of the market rents is simply

$$\sum_{t=0}^{T} \frac{R(t)}{(1+r)^{t}}$$

The overwhelming majority of the units built or rehabilitated under all of the programs under consideration are still in existence. Most of these units continue to be used to house low-income households in the program under which they were built or rehabilitated. Many others continue to be used to house low-income households under more recent programs that require assisted households to live in the units in order to receive a subsidy. That is, the projects have been shifted from one government housing program to another. This includes many units occupied by recipients of Section 8 certificates that are tied to particular units. Finally, some projects no longer have ties to a particular housing program except when individual units happen to be occupied by recipients of vouchers and certificates who have freely chosen these units.

In some of the preceding cases, a governmental entity such as a local housing authority owns the project. In other cases, private parties own the project. In many of these cases, the government continues to have contractual financial obligations to the private parties, and the private parties have obligations to the government to provide housing meeting certain standards to specified types of households for some additional period of time. In all of these cases, the simple formulas above must be modified to determine the true cost-effectiveness of the program.

To see why, consider the case of a public housing project that is still in use. Suppose that the federal government has already paid all of the development cost of the project. If we want to determine the cost-effectiveness of the project in providing housing to low-income households over its entire existence, the present value of the costs incurred to date overstate the true costs because these costs produced more than the flow of services up to the present time. They also produced land and structure with some current market value. Therefore, we should subtract from the present value of the costs the present value of the current market value of the project. The market value is the relevant price to subtract even if the property is sold at a below-market price to some user regarded as worthy of a subsidy. The excess of the market price over the sales price is a subsidy to the new use of the property. It is not a cost of providing housing under the subsidized housing program. If, however, it were sold at a below-market price to line the pockets of someone, then the sales price rather than the market value should be used in

9

the cost-effectiveness analysis. This is merely one of the inefficiencies of the housing program. Ignoring this possibility, the present value of the cost is

$$\sum_{t=0}^{T} \frac{C(t)}{(1+r)^t} - \frac{M(T)}{(1+r)^T}$$

where M(T) is the market value of the project on the last day at which data for the cost-effectiveness analysis is available.

This approach correctly accounts for recent modernization expenditures funded by a capital grant. A modernization project improves the housing not only in the year in which the expenditure occurs but also in later years. Indeed, the bulk of the benefit occurs in later years. To the extent that modernization projects provide better housing beyond the current period, the market value of the project will be higher. The preceding formula correctly accounts for these future benefits. For example, a modernization project costing $1,000,000 that was just completed and paid for at the end of the last period and that increased the market value of the project by only $500,000 would increase the present value of the costs by the present value of $500,000 without affecting the present value of the market rents through the end of the last period. In the preceding formulas, the modernization project would increase C(T) by $1,000,000, increase M(T) by $500,000, and have no effect on R(T). Hence, it would reduce the cost-effectiveness of the project.

Now consider the case of a project owned and operated by private parties under contract with the government to provide housing to low-income households. For simplicity, assume that this project has been under the same program since its construction or rehabilitation. The government may have provided some upfront subsidy, and it might have agreed to pay certain rents for the units over the term of the contract. Suppose that we have not reached the end of the contract so that the government has future contractual obligations. The owners have agreed to serve certain types of households and to provide housing meeting certain standards over the entire term of the contract. Even if the standards were vigorously enforced, this does not mean that the units will be in the same condition or have the same market rent at each point in time.

10

The standards do not apply to all aspects of the housing and the units may have exceeded standards when they were built. The failure to vigorously enforce standards creates additional opportunities for variation in the market rents of the units over time. In this case, we would want to add the present value of predictions of the market rents of the units over the remaining years of the project to the present value of market rents up to the current time and the present value of the rents that the government has agreed to pay over this period to the present value of the costs incurred up to the present time.

Since the government does not own the project at the end of the contract, its market value should not be subtracted from the present value of the costs. It may be the case that this program has provided a windfall gain to the owners of the project by giving them an unusually valuable property at the end of the contract given the magnitude of their investment. If so, this is one of the inefficiencies of this type of housing subsidy.

If a project that is owned and operated by private parties under contract with the government to provide housing to low-income households has shifted from one program to another, for example, Section 236 to Section 8, then the project has a cost-effectiveness under the first program that may differ from its cost-effectiveness under the second program. Ideally, we would calculate its cost-effectiveness under the first program by subtracting the present value of the market value of the project at the time of its conversion from the present value of the costs incurred under the initial program and then include this market value as its initial cost under the second program. A more practical alternative would be to treat projects that are operated under several programs as if they are operated under a completely separate program, for example, Section 236/8.

Unless the ratio of total cost to market rent is about the same in each year of a program's existence as in the case of vouchers and certificates, the cost-effectiveness of a program depends importantly on the discount rate used to calculate the present values. The issue of the appropriate discount rate to use for a cost-effectiveness analysis of housing programs has not been seriously considered in the literature on this topic.

Although it should be addressed in a serious discussion of the conceptually correct approach to the cost-effectiveness of any program involving streams of costs and output, it will not be addressed here except to point out a problem with an obvious approach, namely to use the discount rate $r(0)$ specified by OMB for evaluating streams

of benefits and costs.[5] Suppose, for simplicity, that the entire amount necessary to pay for a project is borrowed at a market rate of interest r(1). If r(0) is less than r(1), the present value of the mortgage payments at the OMB discount rate will be greater than the initial cost of the project. In this case, to say that r(0) is the appropriate discount rate for this stream of costs is to say that it is better for the government to pay for the project with a capital grant than by making mortgage payments on a market-rate loan. Since the federal government can borrow at a lower interest rate than any private business, this line of reasoning seems to lead to the implausible conclusion that we could reduce the cost of production of all goods by financing all private businesses through government loans financed by government borrowing.

IV.   Description and Evaluation of Past Studies

A.   *Practical Problems Encountered in Studies of Project-Based Assistance.*

Before proceeding to describe and evaluate previous studies of the cost-effectiveness of project-based housing assistance, it is useful to mention the practical problems that have made it difficult to implement the approach described in the preceding section.

First, although data on some of the immutable characteristics of the projects such as the number of apartments, the type of building materials, some amenities, and address are available for most programs in their administrative records, data on the condition of the unit in each year from initial occupancy to the present is not readily available. Since these units are supposed to be checked for compliance with the program's housing quality standards each year, substantial information should be available in the local offices that conduct these inspections, but it is almost surely not retained for very long.[6] Therefore, predicting the market rents of units in the project over the life of the project poses a substantial challenge.

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[5] It should and will be addressed in a later draft of this paper.
[6] To the best of my knowledge, no one has attempted to obtain information from this source.

Second, subsidized projects typically receive subsidies from multiple sources, and the magnitude of these subsidies does not appear in the records of one agency. For example, state housing agencies select and administer many Section 8 NC/SR projects. These projects were financed with bonds whose interest is tax deductible, receive periodic housing assistance payments from HUD, and sometimes receive local property tax exemptions or abatements. The typical LIHTC project receives subsidies from many sources and the number and types of subsidies received vary greatly across projects. These projects often receive loans at below-market interest rates from many sources (Cummings and DiPasquale, 1999; Stegman, 1991) and about 39 percent of the units receive periodic project-based Section 8 housing assistance payments (GAO, 1997, p.40). As a general matter, the magnitudes of indirect subsidies such as tax exempt financing and local property taxes do not appear in the records of any agency, and the magnitude of each direct subsidy appears in the records of the agency that provides it.

When different projects under a broad program receive different combinations of subsidies, we are faced with the issue of whether and how to distinguish between these different program variants. At one extreme, all of the sources of funding for housing subsidies could be enumerated, and the units receiving each combination of these subsidies could be treated as being part of a separate housing program. In this case, all units built under the LIHTC but receiving no other housing subsidies directly or indirectly would comprise one program. All units built under the LIHTC, occupied by households with Section 8 certificates, but receiving no other types of housing subsidy would comprise another housing program. At the other extreme, we could analyze broad programs of project-based assistance such as public housing and Section 8 New Construction. This would lead to estimates of cost-effectiveness that are averages of all of the variants within each broad program.

B.   *Housing in the Seventies (1974)*

The National Housing Policy Review Task Force conducted the first major cost-effectiveness analyses of housing programs in 1973. The results are reported in U.S. Department of Housing and Urban Development, *Housing in the Seventies*, 1974,

Chapter 4. This study was done rapidly during President Nixon's moratorium on additional commitments under low-income housing programs.

Although a technical appendix describing how the results were obtained was not published, I can describe the data and methodology underlying the study of public housing because I did this study. Since this study used the conceptually correct methodology and it has not been fully implemented in later studies, it is worth reviewing.

The data underlying the estimates of the cost-effectiveness of public housing are for 11 projects located in 6 large cities (Baltimore, Boston, Los Angeles, St. Louis, San Francisco, Washington). Neither the cities nor the projects were chosen at random. These projects were completed between 1953 and 1970. Ten of the projects are conventional public housing and one is turnkey public housing. (Under turnkey public housing, developers choose the design and location of proposed projects.)

The data on development and operating cost and project physical characteristics come from HUD administrative records. The Development Cost Summary contains the cost of developing every public housing project for each year during the construction period. (For the projects in this study, the construction period was never less than one or more than four years.) The DCS also contains information on the number of units of each size in each project. About 3% of public housing units under management in 1971 were built on urban renewal sites. Since these sites are transferred to public housing authorities at no cost or possibly sold at a below-market price and we could not easily obtain the market value of this land, we did not select any projects built on urban renewal sites. Some public housing is built on land donated by other federal agencies (e.g., land on military bases that were closed after the Second World War) and local governments. However, we did not figure out how to identify these projects, and we did not know the fraction of public housing projects in this category. If one of our projects received this indirect subsidy, we understated its development cost.

Data on the cost of operating public housing are not usually available at the project level. However, data on each year's operating cost and number of units are available at the level of the housing authority from the Statement of Operating Receipts and Expenditures. It was assumed that each of the 11 projects in the sample had the average operating cost for its PHA each year. This probably overstates the true operating

cost since the public housing program began in 1937 and none of the units in the sample were completed before 1953. That is, these projects were among the newest at the time of the study. Obviously, it would have been possible to improve upon the predictions of the operating costs of these projects with the data that was available.

To get a correct measure of the true operating costs of providing housing in public housing projects, two adjustments to the data on operating expense are required. First, a part of the administrative cost is the cost of administering a transfer program such as checking on eligibility. These are costs that are not incurred by providers of unsubsidized housing. Based on rather crude previous research, one half of the local housing authority (LHA) administrative cost was attributed to administering a transfer program as opposed to managing housing. This amount was subtracted from the LHA's administrative cost. Federal administrative cost was ignored. Second, local housing authorities do not pay full property taxes. Instead they make a small payment in lieu of property taxes (PILOT). To obtain the full cost of operating public housing, it is necessary to add to the reported costs the difference between full property taxes and PILOT. To obtain the full property taxes on public housing units in each city, we multiplied an estimate of the market rent of all of the units in a project by the ratio of full property tax to rent for unsubsidized units in each city reported in a well-regarded study of the property tax (Netzer, 1966).

The present value of the stream of development and operating costs through 1971, the last year of the data used in the study, overstates the cost that has been incurred up to that point to provide housing to public housing tenants because the land and structure have a market value at that time. The present value of the market value of the project must be subtracted from the present value of the stream of costs to obtain the present value of the costs incurred to provide housing up to the last year of the data.

The market value of each of the projects at the end of 1971 was estimated by multiplying an estimate of the market rent of the public housing units in the last year of the data by an estimate of the ratio of market value to the previous year's market rent for unsubsidized rental housing sold in recent years (that is, the gross rent multiplier). The estimate of the ratio of market value to the previous year's market rent for unsubsidized rental housing sold in recent years was obtained from a person working on the Task

Force who had many years of experience in the D.C. real estate market. The ratio of value to annual rent used to predict the market value of each project in 1971 was seven. That is, we multiplied an estimate of the annual market rent of all of the units in the project by seven to get a prediction of what the project could be sold for if it were sold to the highest bidder. Obviously more care in making the prediction of market value of each project would have been desirable. However, the time available to complete the project precluded a more careful analysis.

The final element needed to complete the cost-effectiveness analysis is a prediction of the market rents of all of the units in a project from the first year that they were occupied through the last year of the data. The present value of these market rents tells us what we got for our money in terms of housing provided to recipients. The last year's market rents are also used to predict the market sales price of the project. These predictions were based in part on Robert Gillingham's estimated relationships between market rent and housing characteristics in the cities involved in 1960. (Gillingham was in the Research Division of the BLS's Office of Prices and Living Conditions at the time, and his methods, data, and results were well documented in a research discussion paper.) The Project Physical Characteristics form contains information on many characteristics of the public housing projects that appear in Gillingham's regression. I made educated guesses about a few variables. For example, since the oldest project was built in 1953 and hence was less than 20 years old in the last year of the study, I assumed that none of the units in these projects were deteriorating or dilapidated in any year between 1953 and 1971 as the Census Bureau used these terms in 1960. Combining Gillingham's estimated equations, data from PPC, and some innocuous assumptions enabled me to predict the market rent of each of the units in the projects in 1960. To predict market rents in other years, I used Gillingham's equation to adjust rent for changes in the age, and hence condition, of the units and the BLS housing price index in each city to adjust for changes in housing prices.

The stream of costs (minus the market sales value of the project in the last year) and market rents were both discounted at 7.5% back to the first year that expenses were incurred to build the project. This was approximately the interest rate on first mortgages

16

in 1971. Limited time permitted little consideration of the appropriateness of this interest rate.

For 9 of the 11 projects, the present value of the costs exceeded the present value of the market rents. The ratio of the present value of the costs to the present value of the market rents varied from .87 to 2.05. When all figures were expressed in 1971 Washington, D.C. prices and aggregated over all projects, the conclusion was that it costs $1.17 to provide a dollar's worth of housing under the public housing program, excluding the costs of administering a transfer program.

Another important result of this study is that only 42 percent of the cost of the public housing program to the federal and local governments appeared explicitly in the HUD budget. Thirty six percent of the cost to governments was attributable to the tax exempt status of the interest earned on local authority bonds, and another 22 percent to the difference between full property taxes and the smaller payments made by local housing authorities to local governments. (The former indirect subsidy has not existed since 1987 when development grants replaced annual contribution contracts. However, almost all public housing was built before that date.) Since many project-based programs involve subsidies that do not appear on the books of the agency administering the program, the preceding result makes clear the importance of considering subsidies from all sources in assessing the cost-effectiveness of alternative programs.

These results are obviously based on a small sample, and many of the predictions of individual elements required in the analysis are highly improvable. However, from the viewpoint of illustrating the appropriate methodology, this is still the best study in existence. Later studies were typically based on more and better data, but did not implement the full life cycle approach.

C. The Benefits and Costs of Public Housing in New York City (1983)

Olsen and Barton's study of public housing in New York City illustrates a more typical approach to estimating the cost-effectiveness of a housing program.[7] It attempted to estimate the market rents of public housing units in 1965 and 1968 and what the

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[7] In 1968, New York City accounted for 21 percent of all public housing in the United States.

expenses of the New York City Housing Authority would have been in 1965 and 1968 if the interest on their bonds had been subject to federal income taxation and they were required to pay full property taxes. It ignores market rents and costs in other years.

Using data on the initial development cost and completion date of each public housing project in New York City, we calculated how much the authority would have been paying on its loans in 1965 and 1969 had it borrowed at an appropriate market rate of interest and made equal payments on these loans over 40 years. (Almost all permanent financing was of this duration.)

The problem with this approach is that it involves an arbitrary allocation of the original development cost to particular years. For example, none of the original development cost would be attributed to any year beyond the fortieth. Virtually all public housing built in the 1940s has continued to provide housing for the past twenty years, and its ability to do it depends on the land and large parts of the structure built more than 60 years ago.

To this amount attributed to development cost, we added the Authority's operating cost, excluding all administrative costs, and an estimate of difference between full property taxes (based on the ratio of property taxes to rents of unsubsidized, uncontrolled rental housing in NYC and estimates of the market rents of public housing units) and the Authority's PILOT. The exclusion of all administrative expenses understates somewhat the cost of providing housing since some of the administrative cost is attributable to the ordinary functions of operating rental housing in the unsubsidized sector. The preceding approach does account for the two major hidden subsidies involved in public housing.

An equation explaining the market rents of unsubsidized, uncontrolled rental housing in terms of their characteristics was estimated using data from the 1965 and 1968 NYC Housing and Vacancy Survey. This survey collected a limited set of housing characteristics, namely number of bedrooms and other rooms, age of the building, condition of the apartment (sound, deteriorating, or dilapidated), borough, story of the unit, presence of an elevator, and type of heating. This creates the possibility of substantial differences in the desirability of unsubsidized, uncontrolled rental units and

public housing units with the same observed characteristics and hence badly biased predictions of the market rents of public housing units based on this estimated equation.

These estimated equations were used to predict the market rents of each of the 1366 public housing units in the 1965 Survey and the 1515 units in the 1968 Survey. Since the Survey was a random sample of all addresses in the city, the mean of these predicted rents in each year was the prediction of the mean market rent of all public housing units in that year.

Based on these estimates of market rents and costs, we concluded that it cost $1.10 to produce a dollar's worth of housing under the public housing program in 1965 and $1.15 in 1968. Recall that administrative costs are not included. These are the smallest estimates of the inefficiency of public housing in existence.

D.   *Housing Allowances and Other Rental Assistance Programs (1980)*

Mayo, Mansfield, Warner, Zwetchkenbaum (1980) study the cost-effectiveness of public housing (conventional and turnkey), Section 236 (new construction and substantial rehab), Section 23 Existing (the precursor to Section 8 Existing), and housing allowances (minimum condition type used in Experimental Housing Allowance Program and in the Section 8 Existing Voucher Program in effect between 1983 and 1999) in Pittsburgh and Phoenix.[8] They use data on the development cost of public housing units built between 1952 and 1974, Section 236 projects built between 1969 and 1975, and operating costs and characteristics of all apartments in 1975. The sizes of their random samples are:

Program/Urban Area	Pittsburgh	Phoenix
Public Housing	241	225
Section 236	281	87
Section 23	93	138
Housing Allowances	83	65

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[8] Mayo (1986) summarizes the results of this study, the study by Wallace and others (1981), and similar studies of German project-based and tenant-based programs. However, he does not provide a detailed description or critical evaluation of these studies.

Although their study includes a brief life cycle analysis based on many strong assumptions, the bulk of the report compares the annualized development cost and total operating cost in 1975 with the predicted market rent of the unit. For the construction programs, the annuitized present value of the costs associated with building each project is added to the operating cost, full property tax, and administrative cost of the project in 1975. To account for the change in cost over time and differences in the sizes of units, this measure of total annual cost per unit is regressed on variables accounting for the year built and the average size of the apartments in the project. This regression is used to predict the annuitized development cost and first-year cost of each apartment in the sample had it been built in 1975. For programs using the existing stock, the total cost is calculated as the sum of the rental payment to the owner, operating costs (Section 23), tax losses from accelerated depreciation, and administrative costs in 1975. Data on unsubsidized units in each area is used to estimate a statistical relationship explaining market rent in terms of housing and neighborhood characteristics in 1973. Characteristics of subsidized units are substituted into the estimated relationship to predict their market rents in that year, and then housing price indices were used to express predicted market rents in 1975 prices.

This study has many strengths. It accounts for all major direct and indirect subsidies. It is based on accurate data on capital costs at the times that projects were built and operating costs, local property taxes, and administrative cost in 1975. The costs of Public Housing and Section 236 are adjusted for price changes to reflect costs of building new units in 1975 and operating them in their first year. The study makes accurate predictions of market rents of subsidized units in 1975 based on numerous characteristics of the dwelling units and their neighborhoods and a hedonic regression estimated with a large random sample of about 1600 unsubsidized units in each area.

The weakness of the basic approach is that it ignores market rents and all operating costs beyond the first year. In order to see the likely direction and magnitude of the bias from using these shortcuts, it is helpful to write the conceptually correct measure in annualized terms. The conceptually correct measure is

$$(DC + PVOC)/PVMR,$$

where DC is a project's development cost, PVOC is the present value of operating costs, and PVMR is the present value of the market rents of the project's units. For simplicity, assume that these present values are for the entire period that the project is used to house subsidized households and that it is not owned by the government at the end of this period. This measure is identical to

$$[a(r,T){\cdot}DC + a(r,T){\cdot}PVOC]/a(r,T){\cdot}PVMR,$$

where $a(r,T)$ is the annual repayment over T years on a loan of $1 at an annual interest rate of r.

The shortcut measures of cost-effectiveness such as Mayo, Mansfield, Warner, Zwetchkenbaum's measure typically use the annualized development cost $a(r,T){\cdot}DC$ that appears in this formula. If the authors of these studies had used the annualized present values of operating costs and market rents in the preceding formula, they would have obtained the same results as the life cycle approach. Instead they have used the operating expense and market rent for a single year.

If operating cost and market rent increased at the same constant rate in nominal terms, the annualized PVOR would exceed the operating cost in the first year by the same percentage as the annualized PVMR exceeds the market rent in the first year. As a result, the shortcut measure based on the annualized operating cost and market rent in the first year of the project would overstate the cost-ineffectiveness of the project. That is,

$$[a(r,T){\cdot}DC + {\cdot}OC(1)]/MR(1) > [a(r,T){\cdot}DC + a(r,T){\cdot}PVOC]/a(r,T){\cdot}PVMR,$$

where $OC(1)$ is operating cost and $MR(1)$ is the market rent in the first year of operation. The expression on the left side of the inequality is the primary measure used by Mayo, Mansfield, Warner, Zwetchkenbaum. The expression on the right side of the inequality is the conceptually correct measure.

Unfortunately, the assumption underlying this inequality is implausible on a priori grounds and is inconsistent with the available evidence. A priori, it is reasonable to

21

believe that operating costs increase over time because both the quantities and prices of operating inputs increase, market rents increase due to inflation in housing prices and decrease due to real depreciation, and housing prices typically increase at about the same rate as the prices of operating inputs. As a result, operating costs per unit increase at a faster rate than market rents.

The data on public housing that underlies the results in U.S. Department of Housing and Urban Development (1974) supports this view. In each of the nine projects for which data were available, the ratio of operating cost to market rent increased between 1958, the first year for which data were available, and 1971, the last year of the data. The median rose from .50 to .64. (Two of the eleven projects studied had been in operation for less than two years and hence did not provide useful information about this matter.)

If the rate of increase in operating cost exceeds the rate of increase in market rent by a sufficient margin, the inequality above is reversed. That is, the measure based on operating cost and market rent in the first year understates the cost-ineffectiveness of the program.

Applying the measure used by Mayo, Mansfield, Warner, Zwetchkenbaum to the data from the 1974 HUD study provides some insight into the direction and magnitude of the bias resulting from using first-year operating cost and market rent instead of the annualized present values of operating costs and market rents in calculating cost-effectiveness. For eight of the eleven projects, the first-year approach understates the cost-ineffectiveness of public housing. The largest understatement is 40 percent. The largest overstatement is 16 percent. These results confirm that the bias can be in either direction and suggest that this shortcut typically understates the cost-ineffectiveness of public housing.

Mayo, Mansfield, Warner, Zwetchkenbaum (pp. 157-169) recognize the conceptual superiority of the life cycle approach to cost-effectiveness analysis, and they estimate cost-effectiveness measures based on this approach based on a range of alternative assumptions about rates of increase in operating costs and market rents. The qualitative results are unaffected by these sensitivity analyses. However, the sensitivity

analyses are not based on data on actual time trends in market rent or operating cost under any housing program.

The table below reports the results of their basic approach.

Estimated Ratio of Total Cost to Market Rent
for Units Leased or Constructed in 1975

Program	Pittsburgh	Phoenix
Public Housing	2.20	1.79
Section 236	2.01	1.47
Section 23	1.67	1.11
Housing Allowances	1.15	1.09

Basically, the authors find that the cost of housing allowances exceeds the market rent of the units involved by the cost of administering the program. Subsequent studies (Wallace and others, 1981;Weinberg, 1982; Leger and Kennedy, 1990) have confirmed this finding. A plausible explanation for the large difference in the cost-effectiveness of Section 23 between the two cities is based on the manner in which the units were obtained. In Pittsburgh, Section 23 units were rented directly by housing authorities that assigned tenants to units. In Phoenix, tenants located a large fraction of units. The most striking findings in the table are the excessive costs of the construction programs. Their costs exceed the market rents of the units by far more than the administrative costs.

The study contains a number of other important findings concerning the cost-effectiveness of variants of the programs considered. Turnkey public housing was developed in 1967 to improve the efficiency of the public housing development process. Mayo, Mansfield, Warner, Zwetchkenbaum's results (p. 134) indicate that turnkey public housing is less efficient than conventional public housing. It is often argued that rehabilitation is cheaper than new construction and that nonprofits can produce housing more cheaply than for-profit firms. Their results (p. 135) are contrary to both beliefs.

E.   *Participation and Benefits in the Urban Section 8 Program (1981)*

Wallace, Bloom, Holshouser, Mansfield, and Weinberg, (1981) present highly reliable estimates of the cost-effectiveness of Section 8 Existing Certificates and estimates that unambiguously understate the cost-ineffectiveness of Section 8 New Construction.[9] The costs of Section 8 New Construction are greatly understated by the omission of all indirect subsidies, namely GNMA tandem plan interest subsidies, forgone tax revenue due to the tax exempt status of interest on bonds used to finance state housing agency projects, special accelerated depreciation allowed under the federal income tax, FHA insurance losses in excess of premiums, and foregone local property taxes on some projects. Based on previous research on Section 236, authors estimate (p. 226) that the program's cost is understated by between 20 and 30%. The only cost of the Section 8 New Construction program included in the analysis is the direct rental payment to the owner from the tenant and HUD. Since these payments are known with great accuracy, this provides an unambiguous understatement of the program's cost in a particular year for the units in the sample.

This study is based on data from 16 metropolitan areas selected at random with probability of selection proportional to number of new construction units in the SMSA. The random samples of subsidized units used for the cost-effectiveness analysis consist of 186 units in 32 Section 8 New Construction projects in 13 SMSAs and 276 units occupied by recipients of tenant-based Section 8 Certificates from 83 PHAs in these SMSAs. The Section 8 NC/SR projects were completed and occupied in 1979.

Two different samples of unsubsidized units with different observed housing and neighborhood characteristics were used to estimate relationships explaining market rents. One consisted of data on 40, 560 apartments from the American Housing Survey. The other consisted of data on 1365 apartments in the 13 SMSAs collected by Abt Associates. The data collected by Abt contained more detailed information about housing and neighborhood characteristics.

The data on the unsubsidized units is used to estimate statistical relationships explaining market rent in terms of housing and neighborhood characteristics. With the

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[9] Weinberg (1982) provides a condensed version of this study.

smaller sample, separate hedonics were estimated for four regions with dummy variables for the SMSAs in those regions. For the larger sample, separate hedonics were estimated for each SMSA. Characteristics of subsidized units are then substituted into the estimated relationships to predict their market rents. The mean of the predicted market rents based on the relevant hedonic based on each sample is compared with mean of the rents paid to the owners of the units. The means of the predicted market rents based on the two samples of unsubsidized apartments were similar. This study contains the best estimates of the market rents of subsidized apartments in the literature on the cost-effectiveness of housing programs.

The results based on the Abt data on unsubsidized housing are:

Program	Rent Paid To Owner	Predicted Market Rent	Excess of Owner's Rent over Market Rent
Section 8 New Construction	$362	$291	24.4%
Section 8 Existing	$240	$265	-9.4%

Notes: Total cost of New Construction substantially exceeds rent paid to owner due to indirect subsidies. Cost of each program exceeds rent paid to the owner by administrative cost. To predict correctly differences in the overall desirability of housing under the two programs, the predicted market rents are for newly occupied units. Rent paid to owner is less than predicted market rent for some occupants of existing units because they receive tenure discount.

The results based on the AHS data on subsidized housing are:

Program	Rent Paid To Owner	Predicted Market Rent	Excess of Owner's Rent over Market Rent
Section 8 New Construction	$362	$301	20.3%
Section 8 Existing	$240	$241	0.0%

Notes: Total cost of New Construction substantially exceeds rent paid to owner due to indirect subsidies. Cost of each program exceeds rent paid to the owner by administrative cost. To predict correctly differences in the overall desirability of housing under the two programs, the predicted market rents are for newly occupied units. Rent paid to owner is less than

predicted market rent for some occupants of existing units because they receive tenure discount.

These results clearly show that it costs much more to provide identical housing via the Section 8 New Construction Program than via the tenant-based Section 8 Existing Program.

F.   *The Costs of HUD Multifamily Housing Programs (1982)*

The bulk of the study by Schnare, Pedone, Moss, and Heintz (1982) deals with the extent to which the *development* cost of projects under variants of Public Housing, Section 236, and Section 8 NC/SR exceed the development cost of Section 221(d)(4) projects that are the same with respect to some characteristics. Although Section 221(d)(4) is usually called an unsubsidized program, it provides a small subsidy in the form of a below-market interest rate. A smaller part of the study (Chapter 7 and its appendices) attempt to compare the life-cycle costs of the alternatives.

This study deals with an unusually large number of program variants, namely

- Public Housing
  - Conventional
  - Turnkey
- Section 8 New Construction
  - 202/8
  - HUD-FHA Insured
  - Section 11(b)
  - SHFA-FHA Insured
  - SHFA-Not FHA Insured
- Section 8 Substantial Rehabilitation
  - HUD-FHA Insured
  - SHFA-FHA Insured
  - SHFA-Not FHA Insured
- Section 236 with Rent Supplements
- Section 221(d)(4)

The two largest variants of Section 8 are New Construction HUD FHA-Insured and SHFA Not FHA-Insured. The other new construction variants and the substantial rehabilitation programs are much smaller.

The authors collected accurate data on the development costs and characteristics of a large, stratified random sample of 800 projects built between 1975 and 1979. After expressing all development costs in the prices that prevailed in one time and place, a statistical relationship is estimated explaining development cost per unit in terms of the characteristics of the project, unit, and neighborhood, characteristics of the sponsor, length of the construction period, year that construction began, extent of rehabilitation, and the program involved. The estimated relationship is used to predict the difference in mean development cost of units with the same observed characteristics across programs.

The excessive *development costs* of projects in the heavily subsidized programs compared with projects with the same observed characteristics in the lightly subsidized 221(d)(4) are:

- Section 8 New Construction
    - 202/8   16.8%
    - HUD-FHA   8.7%
    - 11(b)   2.7%
    - SHFA-FHA   10.5%
    - SHFA-NonFHA   6.7%
- Section 8 Substantial Rehab
    - HUD-FHA   -5.6%
    - SHFA-FHA   -3.1%
    - SHFA-NonFHA   8.7%
- Public Housing
    - Turnkey   35.0%
    - Conventional   31.0%
- Section 236 with rent supplements   -1.0%

These results indicate that the *development* cost of public housing exceeds that of identical projects under the lightly subsidized Section 221(d)(4) program by substantial amounts and that the excessive cost is much smaller for the major variants of Section 8 New Construction and virtually non-existent for Section 236 with rent supplements. The results for the rehab programs should be discounted since these projects are likely to be worse with respect to characteristics not included in the regression.

Although these results are of some interest in understanding the sources of inefficiency in construction programs, they do not tell us anything about the overall cost-effectiveness of alternative housing programs. For that, we need the entire stream of payments to the developers over the time that the projects are used to house low-income households. This matter is addressed in Chapter 7 and its appendices.

The methods underlying the results reported in the appendices are explained in considerable detail. Unfortunately, they involve assumptions that almost surely bias the results towards finding no difference in the cost-effectiveness of subsidized and unsubsidized housing. The methods underlying the results reported in the body of the report are hardly explained at all, and the results are quite different from those reported in the appendix. No attempt is made to reconcile the enormously different results.

The results in the appendices are based on estimates of the direct payments to owners of projects (albeit based indirectly on their expenditures and net income), the other direct costs that appear in HUD's budget (administration cost and interest subsidies including GNMA Tandem Plan) and the indirect costs to federal and local governments such as local property taxes forgone and excess depreciation allowed on federal income tax. The present value of these costs during the first 20 years for projects in each program with the same initial observed housing and neighborhood characteristics is calculated and then the constant annual amount with the same present value at a market interest rate (11%) is calculated. Calculations involve assumptions about future trends over 20 years that are not based on program experience.

The assumptions underlying these calculations almost surely lead to an underestimate of the cost of subsidized projects. Specifically, the study (1) ruled out by assumption the possibility that for-profit developers of subsidized projects earn excessive profits, (2) assumed that operating expenditures are the same in subsidized and unsubsidized projects and that a given operating expenditure will lead to the same improvement in housing services in both types of projects, (3) assumed a rate of inflation in operating input prices greatly exceeding the actual rate that occurred over the period considered, resulting in substantial overstatement of that part of the total cost that was assumed to be the same for subsidized and unsubsidized projects, and (4) omitted a few major costs of subsidized projects, namely FHA insurance losses in excess of premiums

for all programs providing this insurance and GNMA Tandem Plan interest subsidies for Section 221(d)(4) and 236 projects. Furthermore, ignoring differences in the services provided to subsidized households by projects beyond 20 years and the total costs incurred to provide these services after 20 years could easily affect the cost-effectiveness ranking of the programs.

The results in the body are based on the operating costs reported in the appendix and a greatly simplified calculation of the costs associated with building the project. Specifically, it is assumed that the annual cost associated with building a project is the level payment on a 40-year loan at the discount rate used to calculate all present values (11%). Only the annual costs over the first 20 years are involved in the present value calculation.

For what they are worth, the results are:

	Body	Appendix
Section 8 New Construction		
202/8	1.2%	-2.0%
HUD-FHA	6.3%	12.1%
11(b)	0.0%	17.5%
SHFA-FHA	7.4%	26.9%
SHFA-NonFHA	3.2%	24.7%
Section 8 Substantial Rehab		
HUD-FHA	-5.8%	0.0%-10.3%
SHFA-FHA	-4.2%	12.9%-23.3%
SHFA-NonFHA	2.6%	23.9%-35.1%
Public Housing		
Turnkey	21.5%	18.3%-29.6%
Conventional	11.6%	9.5%-24.6%
Section 236 with rent supplements	4.5%	5.8%

Obviously, the results in the appendix differ markedly from those in the body of the report.

V.   Conclusions

Previous research suggests that there are large differences in the cost of providing identical housing across different programs that have been used to deliver housing

subsidies. More specifically, the empirical literature is unanimous in finding that tenant-based housing certificates and vouchers provide housing of any quality at a much lower total cost (that is, cost to all levels of government and tenants) than the types of project-based assistance studied, namely Public Housing, Section 236, and Section 8 New Construction\Substantial Rehab.

Despite this research, there has been a tremendous resurgence in project-based assistance via the tax system, federal block grants to state and local governments, and the substantial additional subsidies to public housing and privately owned projects during the past 15 years. Since these new and revised programs have the features that were believed to be the source of the substantial cost-ineffectiveness of the programs studied, it appears that recent housing policies have been designed by a new generation of housing policymakers who are unaware of the previous research.

This paper discusses the reasons to expect that project-based housing assistance will be cost-ineffective compared with tenant-based vouchers, describes the steps in an ideal cost-effectiveness analysis, compares the methodology used in previous studies with the ideal, discusses the strengths and weaknesses of the data and methods used to estimate the inputs required to calculate the cost-effectiveness of the program under consideration, and presents the results of the previous studies. Although the weight of the evidence is substantial, none of the studies uses a conceptually correct methodology and makes highly accurate estimates of all of the magnitudes required to implement this methodology.

When inefficient methods are used to provide housing subsidies to low-income households, this is at the expense of some of the millions of poor households who are not currently served by these programs. With the fixed amount of money allocated to them, inefficient methods reduce the number of households served. Based on the existing evidence, it is reasonable to conclude that replacing current inefficient methods with the most efficient current method would enable us to serve more than a million additional low-income households without additional expenditure or harm to current recipients. In light of the results of existing studies and the consequences of using highly inefficient programs to deliver housing subsidies, cost-effectiveness studies of all of the major discretionary expenditures on project-based housing assistance such as incremental

commitments under the LIHTC and HOPE VI, project-based Section 8 vouchers, and public housing operating and modernization subsidies should be HUD's highest priority for housing policy research.

References

Cummings, Jean L. and DiPasquale, Denise. "The Low-Income Housing Tax Credit: An Analysis of the First Ten Years." *Housing Policy Debate* 10 (1999): 251-307.

Leger, Mireille L. and Kennedy, Stephen D. *Final Comprehensive Report of the Freestanding Housing Voucher Demonstration*. Volume 1 & 2. Cambridge, MA: Abt Associates Inc., May 1990.

Mayo, Stephen K. "Sources of Inefficiency in Subsidized Housing Programs: A Comparison of U.S. and German Experience." *Journal of Urban Economics.* 20 (September 1986): 229-249.

Mayo, Stephen K.; Mansfield, Shirley; Warner, David; and Zwetchkenbaum, Richard. *Housing Allowances and Other Rental Assistance Programs-A Comparison Based on the Housing Allowance Demand Experiment, Part 2: Costs and Efficiency.* Cambridge, MA: Abt Associates Inc, June 1980.

Netzer, Dick. *Economics of the Property Tax*. Washington, D.C.: The Brookings Institution, 1966.

Olsen, Edgar O., and Barton, David M. "The Benefits and Costs of Public Housing in New York City." *Journal of Public Economics* 20 (April 1983): 299-332.

Schnare, Ann; Pedone, Carla; Moss, William; and Heintz, Kathleen. *The Costs of HUD Multifamily Housing Programs: A Comparison of the Development, Financing and Life Cycle Costs of Section 8, Public Housing, and Other Major HUD Programs*. Volume 1 & 2. Cambridge, MA: Urban Systems Research and Engineering, Inc., May 1982.

Stegman, Michael A. "The Excessive Costs of Creative Finance: Growing Inefficiencies in the Production of Low-Income Housing." *Housing Policy Debate* 2 (1991): 357-373.

U.S. Department of Housing and Urban Development. *Housing in the Seventies*. Washington, D.C.: Government Printing Office, 1974.

United States General Accounting Office, *Tax Credits: Opportunities to Improve Oversight of the Low-Income Housing Programs*. Washington, D.C.: United States General Accounting Office, 1997. GAO/GGD/RCED-97-55.

Wallace, James E.; Bloom, Susan P.; Holshouser, William L.; Mansfield, Shirley; and Weinberg, Daniel H. *Participation* and *Benefits in the Urban Section* 8 *Program: New Construction* and *Existing Housing.* Volume 1 & 2. Cambridge, MA: Abt Associates Inc., January 1981.

Weinberg, Daniel H. "Housing Benefits from the Section 8 Program." *Evaluation Review* 6 (February 1982): 5-24.